Computer Code Abstract

PERT-V

A Two-Dimensional Perturbation Code for Fast Reactor Analysis

1. Name of Code: PERT-V.[1]
2. Computer for Which Code is Designed: UNIVAC 1108. Programming Language: FORTRAN-IV.
3. Nature of Code: PERT-V is a two-dimensional perturbation code for use in fast reactor analysis. The code will:
   a. compute reactivity coefficient traverses using first-order perturbation theory,
   b. compute the effective delayed-neutron fraction, the neutron generation time, and the inhour/δk conversion factor, and
   c. compute activity traverses.
4. Method of Solution: Reactivity coefficients are calculated using first-order perturbation theory based on the multigroup diffusion model.
5. Restrictions on Complexity: PERT-V utilizes variable dimensioning to make maximum use of the available core memory.
6. Running Time: A representative 13-group 30×30 mesh problem requires ~1 min on a UNIVAC 1108.
7. Related and Auxiliary Programs: PERT-V will accept fluxes from the BNW one- and two-dimensional diffusion-theory codes 1DX[2] and 2DB[3] and scalar fluxes from the Los Alamos one- and two-dimensional transport-theory codes DTF-IV[4] and 2DF.[5] The format of the input data is the same for all five codes.
8. Status: In use.
9. Machine Requirements: A 65k core and five peripheral storage devices are required. If a CALCOMP plotter is available, reactivity coefficients can also be plotted.
10. Material Available: A source deck, sample problem, and operating instructions are available from the authors.
11. *Acknowledgment*: This paper is based on work performed under U. S. Atomic Energy Commission Contract AT (45-1)-1830.
12. *References*:

[1]R. W. HARDIE and W. W. LITTLE, Jr., "PERT-V, A Two-Dimensional Perturbation Code for Fast Reactor Analysis," BNWL-1162, Pacific Northwest Laboratory, Richland, Washington (1969)

[2]R. W. HARDIE and W. W. LITTLE, Jr., "1DX, A One-Dimensional Diffusion Code for Generating Effective Nuclear Cross Sections," BNWL-954, Pacific Northwest Laboratory, Richland, Washington (1969).

[3]W. W. LITTLE, Jr. and R. W. HARDIE, "2DB User's Manual—Revision 1," BNWL-831 REV1, Pacific Northwest Laboratory, Richland, Washington (1969).

[4]K. D. LATHROP, "DTF-IV, A FORTRAN-IV Program for Solving the Multigroup Transport Equation with Anisotropic Scattering," LA-3373, Los Alamos Scientific Laboratory, New Mexico (1965).

[5]"2DF, A Two-Dimensional Transport Code from the Los Alamos Scientific Laboratory," Los Alamos, New Mexico, Unpublished Data.

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